production of all opium containing less than 9 per cent. of morphine was opposed by Sir William Meyer on behalf of India, whose opium averages $7\frac{1}{2}$ per cent. of morphine. The proposal was supported by the United States delegates, who urged that opium should be restricted to purely medical purposes, and that since medicinal opium was opium which contained 10 per cent. of morphine, the Persian proposal was corollary to this end.

Adjournment.

On December 22nd, after holding fourteen sessions, the Conference rose for the Christmas holidays, but not before it had authorized the Redaction Committee to submit to the full Conference additional articles dealing with adhesion, coming into force (mise en vigueur), denunciation, etc., required to complete the final form of the Convention.

The delegates appear to have separated under the impression that their labours were practically completed. The new developments which occurred after the recess, and the delicate and difficult international questions which they involved, will be dealt with in the next article.

(To be continued.)

PRELIMINARY REPORT ON THE FORCIBLE FEEDING OF SUFFRAGE PRISONERS.

AGNES SAVILL, M.D., C. MANSELL MOULLIN, F.R.C.S., AND

SIR VICTOR HORSLEY, F.R.S., F.R.C.S.

Danger and Pain.

It has been stated by the Home Secretary that the practice of forcible feeding is unattended by danger or pain. We have carefully considered the written statements of 102 of the suffrage prisoners, of whom 90 have been subjected to the operation of forcible feeding; we have personally examined a large number of these prisoners after their release, and we have communicated with the physicians who have attended those prisoners whose condition on release necessitated medical care. The facts thus clicited give the direct negative to the Home Secretary's assertion that forcible feeding, as carried out in His Majesty's prisons, is neither dangerous nor painful. We are confident that were the details of the statements we have read and cases we have examined fully known to the profession this practice, which consists, in fact, of a severe physical and mental torture, could no longer be carried out in prisons of the twentieth century.

Forcible feeding has been carried out by nasal and by ocsophageal tubes, and by the feeding cup. The feeding cup method is frequently forcibly administered solely by the wardresses, without the supervision of a qualified medical practitioner. In the majority of cases the feeding has, on principle, been resisted to such a degree that two doctors and four to six wardresses were required for each operation, and in several instances the officials were held at bay for periods varying from ten minutes to over an hour. But it is to be observed that even in many cases where no resistance was offered, great pain was experienced under the operation. In these circumstances it is not surprising that many prisoners state that after one operation of forcible feeding they experienced more serious symptoms and pain than after several days' starvation. One prisoner we examined (K. M.), a strong woman of fine physique, was so seriously injured by only one feeding that she had to be removed to hospital after it; and she is but typical of a considerable number.

The suffrage prisoners, it should be noted in passing, have never hunger struck to shorten their sentences, but only to obtain equality of prison treatment for prisoners convicted of like offences, and for justice in observance by the prison officers of the prison rules, especially 234a granted by Mr. Churchill when Home Secretary, but withheld for some time or in part by Mr. McKenna.

According to the Home Secretary, forcible feeding was instituted by him to keep the suffrage prisoners in health, and also to prevent them bringing about remission of their sentences, for which, however, they have never hunger struck. But in the large majority of the cases it has had precisely the opposite effect. Mr. Ellis Griffith admitted in the House of Commons that on one day (June 26th, 1912), from three prisons (Holloway, Maidstone, and Winson Green, Birmingham), no fewer than twenty-two prisoners had to be released and placed under the care of their friends in order to save their lives. Again, at the commencement of the hunger strike, twelve prisoners were immediately released, upon whom forcible feeding was never attempted, because the doctors of the prison were afraid to risk the operation upon them. Further, out of a total of 102 cases of prisoners who joined in the hunger strike we have investigated, forty-six were released long before the termination of their sentences, because their health had been so rapidly reduced as to alarm the medical officers. In many cases the forcible feeding with the nasal or oesophageal tubes had been carried so far that the condition of the prisoners was so enfeebled thereby as to compel the authorities to release them under the care of a special attendant, who accompanied them to their homes, and remained with them until the assistance of their friends could be obtained.

It is therefore not correct to say, as the Home Secretary did in the House of Commons, that he ordered his forcible feeding in order to preserve the health of his prisoners.

No Danger to Life or Health when Prisoner does not Resist.

The Home Secretary, further, has repeatedly stated (especially *Hansard*, May 20th, 1912): "There is no danger to life or health from the process of feeding by Where there is any danger, it arises from the violent resistance sometimes offered by the prisoners." And Mr. Ellis Griffith stated, in reference to a particular case: "If she suffered any pain, it was due entirely to the violent resistance she offered to what was necessary medical treatment."

These statements are not borne out by our investigations. One example out of several will suffice to illustrate this point.

M. F., a skilled trained nurse, never resisted the operation. At Easter she was fed twice daily for eight days. The pain endured surpassed that of any nasal operations she had undergone in previous years, and she lost 131b. in weight. The "privileges" of the prison rules demanded being granted by the Home Secretary, the hunger strike ended. She regained her health, and felt quite strong and well when a second hunger strike began in June. On the second day of the forcible feeding she had to be discharged on "medical grounds." The pain caused by the forcible passage of the tube through her nose caused a collapse after each feed, and on account of the palpitation and cardiac irregularity set up the doctors considered further feeding too "dangerous to health" to be persisted in. This also is a type of many similar cases.

Physical Injuries Inflicted on Prisoners.

During the struggle before the feeding, prisoners were held down by force, flung on the floor, tied to chairs and iron bedsteads. As might be expected, severe bruises were thus inflicted. The prisoners, however, did not complain of these. They regarded them as the inevitable consequences of political war.

Forcible feeding by the oesophageal or nasal tube cannot be performed without risk of mechanical injury to the nose and throat. Injuries to the nose were especially common, owing chiefly to the lack of previous examination and skill in operating. Though the medical officers were informed in several cases that the nasal passage was known to be blocked and narrowed by previous injury, no examination was made. The prisoners were usually flung down or tied and held while the tube was pushed up the nostrils. The intense pain so produced often forced uncontrollable screams from the prisoners. In most cases local frontal headache, earache, and trigeminal neuralgia supervened, besides severe gastric pain, which lasted throughout the forcible feeding, preventing sleep. One says:

"After each feeding it (the nasal pain) gets worse, so that it becomes the refinement of torture to have the tube forced through." The nasal mucous membrane was frequently lacerated, as evidenced by bleeding of the nose and swallowing of blood from the back of the nose. Sometimes the tube had to be pushed up the nostrils three to five times before a passage could be forced.

In several such cases bleeding continued for some days; in one case it recurred for ten days. In another case an abscess followed, with intense pain over the frontal region, which lasted for weeks after release. Swelling of the mucous membrane of the nose and pharynx developed almost invariably; it was accompanied by Eustachian pain, and frequently this was succeeded by severe pain over the entire area of distribution of the fifth nerve. This trigeminal pain continued as long as the forcible feeding was continued. The equally invariable pharyngitis, which was obviously of septic origin, lasted in certain cases for some time after the release of the prisoner. When the oesophageal tube was employed the mouth was wrenched open by pulling the head back by the hair over the edge of a chair, forcing down the chin, and inserting the gag between the teeth. Naturally, in this process the lips, inside of the cheeks, and gums were frequently bruised, sometimes bleeding and sore to touch for days after. In a number of cases, when the wardresses attempted to forcibly feed with a cup, they endeavoured to make the prisoner open her mouth by sawing the edge of the cup along the gums. In one case a cup with a broken edge was used and caused laceration and severe

Accidents.

The danger of forcible feeding is increased by the accidents liable to accompany the passage of tubes down the nose or throat. In several instances the oesophageal tube was passed into the larynx. Even in cases who did not offer resistance great pain and suffocation was caused by the clumsy use of the nasal tube, when it coiled up in the back of the throat or came out of the mouth and then had to be reinserted several times. The severe choking and vomiting which sometimes accompanied the passage of the tube led to danger from the entrance of food into

The injection of food into the lung actually occurred in the case of one unresisting prisoner, in whom the operation immediately caused severe choking, and vomiting was followed by persistent coughing. All night the patient could not sleep or lie down on account of great pain in the side of the chest. She was hurriedly released next day, so ill that the authorities discharging her obliged her to sign a statement that she left the prison at her own risk. On her arrival at home she was found to be very ill, suffering from pneumonia and pleurisy due to the food passed into the lung. Being, fortunately, a young and strong woman, she escaped with her life.

Effects on the Circulatory System.

In a large number of the written statements we find that after the feeding violent palpitation occurred, frequently so severe as to prevent sleep. In certain cases it would appear that the cardiac nerve mechanism was profoundly affected, for a degree of irregularity of the cardiac rhythm is reported even by the physicians attending released prisoners. In some cases who had never previously suffered from any heart trouble this irregularity continued to occur for some weeks after release, in spite of rest in bed under medical care. Giddiness, faintness, and weakness were frequent symptoms. Collapse took place in many cases after but few (two to four) attempts at forcible feeding. The prisoners became icy cold and had to be removed to the hospital cells and surrounded with hot bottles. In most of the cases who came under our personal observation and under the care of other physicians the temperature remained subnormal (96.4° to 97.4°) for some weeks after release, even although the time was spent in bed with eareful feeding and other medical treatment.

Effects of Forcible Feeding on the Stomach and

Alimentary System.

The well-known principles and precautions for correct artificial feeding were not observed in the prison forcible feeding. Into the completely continued. feeding. Into the completely empty and contracted stomachs of patients who had fasted for variable periods (usually twenty-four to forty-eight hours), the officials (a) rapidly poured (b) large quantities of (c) often cold liquid. Such a procedure, as is well recognized in hospital practice, inevitably causes pain, often agonizing, with distension and ballooning of the stomach, as well as spasm of the muscular wall of the organ. As a necessary consequence, regurgitation and vomiting followed in by far the large majority of the cases. The following statement may be quoted as a typical example:

In Birmingham (May 29th) I was fed by nasal tube. Knowing what to expect I braced up my nerves and sat quietly in the

chair, instead of struggling and fighting against it, as I had done in Newcastle. The passage of the tube through the nose caused me but little inconvenience this time, but its further passage caused me to retch, vomit, shake and suffocate to such an extent that in the struggle for air I raised my body till I stood upright, in spite of three or four wardresses holding me down, after which I sank back in the chair exhausted. When the tube was withdrawn I seemed to be afflicted with chronic asthma, and could only breathe in short gasps. To take a deep breath caused me excruciating pain. Two wardresses helped me back to my cell, where I lay in agony, the pain becoming worse every moment. I vomited milk, which eventually became tinged with blood, etc.

When vomiting did not occur, the majority of prisoners suffered acutely from the severe pain of the sudden distension of the stomach.

Every prisoner has suffered from indigestiondistension, heartburn, nausea and sickness. medical certificates we have before us from practitioners who have examined prisoners after release include these The following certificate is typical:

At midnight on July 1st I was called to see Miss R., and found her just recovering from an attack of pain, so severe as to collapse her, after attempting to take food on her return from Holloway. I put her on the very lightest nourishment in very small quantities, and otherwise found it necessary to treat her as a complete invalid for some days.

Vomiting often continued for hours after the operation. of forcible feeding. The nutritive value of such "ordinary medical treatment," as it has been termed by the Home Secretary, was, of course, in the majority of cases, nil, and in many cases life had to be saved, not by forcible feeding, but by the prompt release and restoration of the prisoner to her friends and to legitimate medical treatment. Vomiting was not, as has been alleged in Ministerial statements, brought on by resistance. One of the worst cases was that of a married woman beyond middle life, who made no resistance at all. The following is an abbreviation of her statement:

After the first feeding by the nasal tube she was locked in her cell, and felt as if she would go mad with pain in the ears, running of the nose, and vomiting all through a sleepless night. On the following day she was gagged (though not resisting) and fed by the oesophageal tube, which caused her extreme pain and faintness. The throat bled, and she vomited profusely. She fell exhausted on the bed, and was left alone in her cell, where she vomited at intervals all the morning. In the afternoon the feeding process was actually again begun, when suddenly the heart appeared to stop beating. The tube was immediately pulled out, but the patient fainted. She vomited incessantly during the night, feeling intensely ill with a swollen sore throat. In the morning she was released by urgent order of the Home Secretary, and was removed to a nursing home, where she slowly recovered strength until after some days she could be removed to her home. In this, as in many others, no respite of the feeding or any medical treatment were given. After the first feeding by the nasal tube she was locked in her

That such malpractices and torture could be meted out to prisoners by medical officers we should have believed impossible at the present day had we not numerous cases of the kind before us.

As may be readily understood, the severe indigestion set up by forcible feeding led to other troubles of the bowel. However incredible it may seem, it is a fact that in Holloway Prison the prisoners were locked up in their cells for three to four hours consecutively, by order, it is stated, of the prison doctors, thus being prevented from access to the lavatories at a time when most required. In very many cases dyspepsia has continued for weeks or months after release.

General Inanition.

Medical practitioners who knew certain prisoners before Medical practitioners who knew certain prisoners before their imprisonment and examined them after release report the supervention of anaemia with considerable loss of weight. One lost 13 lb. in eight days of forcible feeding, another 9 lb. in five days, another 8 lb. in a fortnight, while others report a loss of 9 lb., of 1 st., and 2 st. during the term of imprisonment. This is not surprising when one remembers what has been already surprising when one remembers what has been already pointed out in the description of the effects upon the alimentary canal. As the majority of the prisoners vomited up so much of the liquid administered to them, anaemia and decrease in weight were necessary consequences. This result of prison forcible feeding is directly contrary to the results of tube-feeding when used as form of medical treatment in asylum and hospital a form of medical treatment in asylum and hospital practice.

Effects on the Nervous System.

Every physician who has examined the released suffrage prisoners agrees that in the majority of cases by far the most serious effects of the treatment by forcible feeding fall upon the nervous system. The younger prisoners escape with the least serious effects, but in those over 30 years of age the nervous symptoms are more marked and more lasting. Before enumerating the symptoms, we desire to point out that the suffrage prisoners enter prison in a totally different state of mind to that which is met with in asylum practice, to which the condition of treatment has been compared. These women are normal individuals who go to prison as political offenders; they are protesting against what is, to them, an unjust anomaly, and they assert in consequence that they should not be treated as common felons. With the keen sense of suffering political injustice rankling in their minds, they determine on the hunger strike, not to obtain release, as has been asserted, but to obtain equal treatment in prison during the term of their sentences for prisoners convicted of like offences, or to obtain from the authorities the due observance of the prison rules.

We are not here concerned to discuss the right or wrong of the political methods of the militant suffragist. merely point out that on admission the prisoners are in a normal mental condition, which cannot be said of the patients who refuse food in the asylums. We have personally examined a number of the released prisoners, we have obtained medical certificates from the physicians who have attended others immediately on release, we have questioned the friends, and we have carefully considered the statements of those who have not come under medical care until some time after their release. In the evidence wo have personally examined, and in the certificates afforded us by other physicians, there is certainly no evidence of "hysteria"—using that much abused word in the sense of exaggerated or excessive display of emotion. On the contrary, the suffrage prisoners have invariably described their experiences with precision and restraint, deprecating their own share of suffering, and minimizing what they have themselves endured. They only expressed themselves with feeling when relating the sufferings of their friends and the repulsive conditions of the

prison.

We may group the effects on the nervous system under the following headings: (a) Symptoms on release from prison; (b) mental condition during imprisonment.

(a) Symptoms on Release from Prison.

Undoubtedly the strain on the nervous system was in every case extremely severe. In general terms, the younger and stronger the physique of the prisoner, the less the torture told on the general condition. On the other hand, the better the physique of the patient, the longer she was compelled to endure the feeding, and hence it happened that in several women a state of acute delirium set in, after a long period of courageous endurance, ended only by a hurried release. They can remember nothing of the last twelve hours in prison, the mind being a blank except for the recollection of a sudden consciousness that the doctor and wardresses were surrounding the bed and promising immediate release. For weeks afterwards sleep was broken and disturbed by horrible nightmares and dreams. These patients were on the verge of acute neurasthenia, apathetic and indifferent to matters of interest and importance. In the older patients who had been released at an earlier stage of the forcible feeding, there was a constant feeling of apprehension, with the same symptoms of broken sleep and painful dreams. In others, the characteristic symptoms of neurasthenia were present—inability to concentrate the attention on the simplest matter, loss of memory, hyper-sensitiveness to sounds, great fatigue, and general muscular weakness. In others, again, the following physical signs predominated: Weak pulse, irregular at intervals, dyspeps a, pruritus, and vasomotor instability, all indicating profound disturbance of the system generally. In many cases, under efficient medical care, the nervous system recuperated by means of a maximum of sleep. The patient would be drowsy all day, and sleep for fourteen to sixteen hours out of the twenty-four during the first week after release was not uncommon. In none of the cases seen by us or by other physicians, nor in the written statements, have we found any mental condition resembling the introspective or irrelevant ramblings met with so constantly in the average self centred neurasthenic of the textbooks and the consulting room. These patients, without in any way exalting their experiences, regarded them as horrors which must be borne for the sake of the political and moral principle for which they were undergone.

Further physical signs of cerebro-spinal neurasthenia were present in the large majority of the cases examined. The knee reflexes were exaggerated. The patients were readily startled and easily fatigued. In some cases the extreme pain, headache, and neuralgia, which had been started by the passage of the tubes, remained as troublesome symptoms. Most were unable to concentrate their attention on professional work for months after. Many patients were kept in bed for a month; some had tremors, and for several weeks were scarcely able to walk.

In one case an attack of functional paralysis of the upper part of the body on the right side followed the sixth attempt at forcible feeding. The patient describes it thus: "The whole of my face and the upper part of my body became rigid, and though I was quite unable to move or speak, it was fearfully painful to be touched. I had great difficulty in breathing. Later in the evening the doctor told me that he could not stop feeding me on account of this attack. They attempted to feed me next morning, but, after several attempts, found it impossible to get the tube down my throat. The same symptoms of paralysis occurred. I was released later in the same day."

Severe retching occurred in every case. In a large number of cases there was frequent vomiting, even when the patient felt too weak to resist the operation, and was suffering only from nervous exhaustion. A few prisoners describe a condition of nervous prostration, with breathlessness, lasting from a few hours to several days. In one case, although the patient took her food in the ordinary way after the first attempt at forcible feeding, the horror of the recollection of the operation, combined with the effects of the shock and pain, reduced her to this condition.

(b) Mental Condition during Prison.

To the physical torture of forcible feeding the prison officials in many cases added the intellectual torture of solitary confinement, and to this was added the mental anguish caused by hearing the cries, choking, and struggles of their friends. When there were many cases selected by the medical officers or the Home Secretary for forcible feeding, this mental torture was prolonged for several hours twice and sometimes three times daily. With a nervous system already overwrought by this ordeal, each prisoner faced her own struggle. On an average, the resistance could only be overcome by the united services of four to six wardresses and two doctors. After the insertion of the tube the patient often fell into a state of collapse, from which she had scarcely emerged before the terrible noise and groans of the next feeding time began again. Many robust and healthy-minded women, whom no one could term neurotic, state that they feared they were going mad; they could not's sleep, and many felt suicide would be preferable. The terror was accentuated by the fact that in most of the prisons for the greater part of the time of imprisonment they were locked up in their cells of solitary confinement, and left all day and night with the thought of the past and the dread of the future ordeal always before them.

One prisoner whom we interviewed, and whom we can certify as possessing a normal mental condition, writes:

As the hour for forced feeding drew near I could not help being deeply agitated, and I used to stand or sit, or walk about in a state of horrible suspense with my heart thumping against my ribs and listening to the footsteps of the doctors and wardresses as they walked to and fro and passed from cell to cell, and the groans and cries of those who were being fed, until at last the steps paused at my door . . . my turn had come.

A skilled trained nurse writes:

I will say nothing of the mental misery which accompanies such experiences, because this is indescribable.

Another writes thus:

From 4.39 until 8.39 I heard the most awful screams and yells coming from the cells. I had never heard human beings being tortured before, and I shall never forget it. I sat on my chair with my fingers in my ears for the greater part of that endless four hours. My heart was going like a hammer, and the suspense of it all was terrible.

One prisoner had to be dismissed to her home immediately after only a single feeding, because the acute nervous symptomis which followed the operation led the prison officials to fear a

complete mental breakdown, and to release her immediately in charge of two attendants, although she had only served twelve days of a four months' sentence.

The wonder is that so many of the prisoners retained their sanity. Neurologists, however, will understand what

consequences may develop in the future.

Many points in this matter of forcible feeding of political prisoners and prison discipline and prison hygiene have a direct medical bearing, but cannot be now considered. In the present one of forcible feeding the importance of sterilization of the tubes after each case is obvious, and where a number of patients with septic conditions of the nose, throat, and mouth, phthisis, etc., are herded together in a prison, the danger of infection cannot be exaggerated. Full details of what steps were sometimes taken by the officials in the different prisons cannot be ascertained, but that many prisoners were forcibly fed, one after another, with tubes not sterilized between each case, and by doctors and assistants with unwashed hands, was observed by eye witnesses as well as by those forcibly fed. Naturally a great deal of infection of the nose and throat occurred.

In the light of the facts enumerated in this briefly summarized paper the position of the medical profession in regard to forcible feeding of suffrage prisoners must be considered anew. We cannot believe that any of our colleagues will agree that this form of prison torture is justly described in Mr. McKenna's words as "necessary medical treatment" or "ordinary medical practice."

LITERARY NOTES.

Sunshine and air have long been recognized as potent factors in the cure of consumption, but it has been reserved for the disciples of the art of heliotherapy to discover, and make use of, the healing properties of the sun in cases of surgical tuberculosis. An interesting account of this method of treatment is to be found in the July number of The Child, which contains a description Miss Gertrude Austin of her visit to Dr. Rollier's clinics at Leysin and an enthusiastic account of the merits of heliotherapy in the treatment of tuberculous and rickety children. The subject of open-air schools is treated in the same number of *The Child* both by Dr. Alan Warner and by Dr. D. M. Taylor. The number also contains a short account, by Mrs. Price Hughes and Sister Hope, of another valuable ally in the struggle to preserve the health of the rising generation amongst the labouring classes, namely, the Kingsway crêche; Dr. F. J. Poynton has contributed an article on the diagnosis of appendicitis in children, and the Rev. Cecil Grant writes on the advantages of the co-education of boys and girls.

In a series entitled "Some Royal Deathbeds" a short account of the last hours of Henry VIII was given (May 28th, 1910, p. 1303). The following extracts from a much fuller account, taken from Richard Davey's The Nine Days' Queen (Methuen and Co.), may be interesting to some of our readers:

On the night of Wednesday, January 27th, 1547, Henry Tudor lay dying. . . . The once puissant and magnificent Henry VIII, King of England, France, and Ireland, and Defender of the Faith, was now a mass of deformed flesh, eaten up and disfigured by a complication of awful disorders—gout, cancer of the stomach, rheumatism, ulcers, and dropsy. So swollen were the miserable man's hands, arms, and legs, that he could only move with great pain, and then only with the aid of a mechanical contrivance. . . . Though little over 56 years of age, the dying Monarch's hair had turned quite white, and his beard, formerly so well trimmed, had grown scant and straggling. His steel-grey eyes looked as small in proportion to the broad, bloated face as those set in the elephant's enormous mask, but they still retained their ophidian glitter. The dying king had been unusually irritable throughout the weary day. At times indeed he was delirious, but on the whole his mind remained fairly clear. At about six o'clock in the afternoon he awakened out of a deep sleep or lethargy and asked for a cup of white wine, which was given him. Presently he wandered again, the result, perhaps, of the draught of wine, and shouted "Monks, monks," . . . Three times, too, and very distinctly, he cried out the name "Nan Boleyn." After that he kept his eyes fixed on a certain spot near his bedside, where, it may be, his fancy showed him the menacing wraith of his murdered wife. This

outburst of feverish excitement was followed by a lull, and presently the king grew calmer, and fell into a profound slumber... The physicians in attendance upon the king were Dr. Wendy and Dr. Owen, who had brought the Prince of Wales into the world, and who subsequently assisted at the deathbeds of Edward VI and Mary. With them was Dr. John Gale, the king's surgeon-in-ordinary, who had waited upon Henry and his army when in France... Between seven and eight in the evening of 27th January, Sir Anthony Denny, who had been watching his master very closely, thought he perceived signs that the end was approaching. Stooping over him, he whispered into the dying ear a message especially dreadful to one who, like Henry, held the mere mention of death in horror, warning him that his hour was very near, and that "it was meet for him to review his past life, and seek God's mercy through Jesus Christ." The king, although in great agony, evidently understood what Denny had said, and is reported to have answered that he would suffer no ecclesiastic near him but Cranmer, who was immediately sent for... He found the outburst of feverish excitement was followed by a lull, and prebut Cranmer, who was immediately sent for. . . . He found the king almost speechless, but in full possession of his faculties, and exhorted him, in a few words, to repent him of his sins and "to place his trust in Christ only." Henry pressed the churchman's hand, and muttering the significant words "All is lost!" immediately avaired. immediately expired.

SCIENCE NOTES.

A SERIES of three papers on the infectious disorder of bees, commonly called the Isle of Wight disease, are published by Drs. H. B. Fantham and Annie Porter in the Annals of Tropical Medicine and Parasitology, bearing date July 31st. They deal respectively with the general history of the disease, for which the name "microsporidiosis" is proposed, with the morphology and life-history of Noscma apis, the microsporidian protozoon to which it is due, and with the methods of dissemination. The spore may be taken up by a healthy bee with honey or pollen from a flower previously visited by an infected bee, or from infected comb, or when cleaning an infected bee with the mouth, as is their communal custom. The spore reaches the chylestomach, the main digestive organ of the bee, where its wall is softened; the contained sporoplasm protrudes a polar filament which serves for a short time as an organ of attachment, but is presently rejected. The sporoplasm comes out of the sporocyst, and as a binucleate amoebula comes out of the sporocyse, and as a since control of the chyle-stomach, and soon gives origin to daughter amoebula. These enter and soon gives origin to daughter amoebula. These enter multiply. This stage of the epithelial cells and grow and multiply. This stage multiplication is most dangerous to the host, for number of parasites may be so great that the bee is killed by their destructive effect on the epithelial coat of the chyle-stomach. If the bee survives, the parasites form spores which are highly resistant to outside conditions, and can live for some time without losing their power of infecting healthy bees. These two stages of Nosema apis, the stage of rapid multiplication in the host, and the stage of the resistant spore, which can survive in the outside world, are characters which it has in common with other protozoal parasites, such as the coccidia fatal to grouse, poultry, and cattle. As the bee may be killed by the immense number of parasites produced during the period of multiplication, so young grouse may be killed in the multiplying stage of *Eimeria avium*. As the spores are extremely light they can be carried to considerable distances by wind, and may be deposited on flowers or in water; bees, it appears, dislike cold water, and will prefer to drink water that has been warmed by exposure, though less clean; drinking places favoured by bees may thus become heavily infected. Ants and wax moths, both of which visit hives, may harbour spores, though the spores do not appear to develop in them. Mason bees and wasps may become infected and die. A certain number of honey bees survive an attack of the disease and then act as carriers, so that a "cured" hive in or near an apiary may be a source of serious danger. A queen bee may be infected, and there is some evidence that the ovaries may harbour the parasite; if so, the disease may be congenital. The authors attach much importance to the observation that though *Nosema* is primarily an intestinal parasite, it is occasionally found in the haemocoelic fluid. This they look on as an indication that its potentialities as a deadly organism may increase. Its congener Nosema bombycis is capable of attacking any and every tissue of the silkworm, and if Nosema apis develops a like power it will be a more deadly enemy of the bee than it is to day. This is cold comfort for bee-keepers.